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on many species, thus verifying the thought of Mr. Meehan. From an examination of my preliminary notes upon the genus, verified by a reëxamination of the specimens, I report the finding of cleistogamous flowers upon the following species: *P. arifolium*, in which the achenes in my specimens were incompletely developed; *P. Bolanderi*, *P. Californicum*, *P. Careyi*, *P. Hartwrightii*, *P. Hydropiper*, the condition being extremely common in this species; *P. hydropiperoides*, in which in every case examined the achenes were perfected; *P. lapathifolium*, *P. maritimum*, *P. ramossissimum*, in which case, however, I am not thoroughly convinced as to the cleistogamous character of the flowers so referred; *P. sagittatum*, and *P. Persicaria*. I found that in almost every case in which I had late collections of the species mentioned above, cleistogamous flowers existed. That more species are not included in the list is, I am inclined to believe, due to the fact that the specimens of the other forms in my possession were collected in the earlier portion of their season. I believe that in all cases where collections are made after Sept. 15th, cleistogamous flowers may be reasonably expected.

The figures given by Mr. Kearney in the note referred to above present an exceptional condition. In the many forms which I have examined it only occurs once or twice. Ordinarily the cleistogamous flowers are completely concealed by the sheath, but if well developed their presence may be detected by the appearance of an apparent intumescence of the sheath on one side of the stem and slightly above the node. Occasionally when the sheath is short the tip of the flower may be seen projecting a little beyond its border. In the ordinary herbarium specimen, unless care is taken in the dissection, the flower will be taken for a fragment of the sheath, unless indeed the achene be well developed. I have as yet detected only a single flower at each node, but am not prepared to say that this is the rule.

In this connection I would like to ask botanists throughout the country to send me any notes they may have upon the genus, and to state that I would be glad to receive specimens for examination from such as are willing to spare them for a sufficient time for their proper study.—STANLEY COULTER, *Purdue University, La Fayette, Ind.*

Cultivating the ascosporous form of yeast.—The methods usually recommended for securing the ascosporous state of yeast, i. e. by cultivation upon slices of potato or other vegetables, or even upon plaster of Paris slabs, have always ended in failure in my laboratory, until a recent trial by the method suggested by Hansen.¹ This method con-

¹ Les ascospores chez le genre *Saccharomyces*. Comp. rend. trav. du lab. de Carlsberg, ii, p. 30; also see Zopf, *Die Pilze*, p. 414.

sists essentially of securing particularly vigorous, actively growing yeast plants, which are transferred directly to moist slabs of plaster of Paris, on which they develop the spores very rapidly. The sudden change from the condition with abundance of nutriment to one with almost total absence of it, appears to call out the extreme reproductive safeguard of the species against annihilation.

Hansen advocates starting with pure cultures, from which some cells of yeast are transferred to beerwort for a short time at common room temperature, then a small quantity of the active cells is again removed to fresh beerwort for 24 hours at a temperature of 26–27° C. A supply of the cells thus obtained is sown upon sterilized blocks of plaster of Paris, which are made sufficiently moist to slightly glisten, and are afterward kept in a moist chamber at proper temperature.

The method followed in my laboratory was to add a little yeast, taken from a fresh cake of Fleischmann's compressed yeast, to a Pasteur solution. In a day or two, when the disengagement of gas showed that the yeast was in active growth, the liquid was poured out of the flask, some of the flocculent material adhering to the glass was spread upon the surface of a freshly made cake of plaster of Paris, which was barely moist, and the whole was covered to prevent drying out. The cakes were made by stirring water into powdered plaster of Paris and allowing it to harden in a shallow covered dish. In a few days a most abundant crop of ascospores was obtained. The spores are easily colored with methyl violet; and fine permanent mounts may be made by the coverglass method as used for bacteria.

The work was carried out by Messrs. Wright and Van Pelt of the present senior class.—J. C. ARTHUR, *Purdue University, La Fayette, Ind.*

EDITORIAL.

THERE IS a wide field for American ingenuity in devising new adaptations of apparatus used in other departments, and in inventing new forms of apparatus, with which to illustrate the main truths of vegetable physiology. Much work of this kind must be done before the science can be so generally taught in high schools and colleges as its position as a fundamental science demands. Special forms of apparatus will naturally be brought out to meet the requirements of investigators working in original lines, which will enrich the available supply, but new methods of making old truths clear by means of